

Application Number: 09/913,428

Art Unit: 1754

June 1, 2004

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Amendments to the Claims:

This listing of Claims will replace all prior versions, and listings, of Claims in the application:

Listing of Claims:

1. (Currently Amended): A method for preparing a manganese compound for a lithium manganese complex oxide, comprising ~~the step of~~ simultaneously applying a mechanical force from 0.1 to 1000 dyne/cm² and a heat energy from 50 to 200 °C at a time from 5 minutes to 5 hours to a manganese compound to remove defects present in particles of said manganese compound, and to control the aggregation of micro particles and the shape of the aggregated particles[1], wherein the mechanical force and a heat treatment is applied in an apparatus which applies shear stress to the surface of particles and to which a heating apparatus is attached, and the manganese compound gathers along a rotating chamber wall and receives shear stress and compression stress at a fixing axis of the apparatus.
2. (Currently Amended): The method for preparing the manganese compound according to claim 1, wherein a mechanical force and a heat energy are simultaneously applied to said manganese compound with adding one or more kinds of ~~additives~~ preparations selected from the group consisting of LiOH, LiOH•H₂O, LiCH₃COO, LiCHO, LiCHO•H₂O, LiNO₃, and a transition metal salt having a melting point of 200°C or less.
3. (Previously Presented): The method for preparing the manganese compound according to claim 2, wherein the amount of said preparations is 0 to 20 wt% of the manganese compound.
4. (Previously Presented): The method for preparing the manganese compound according to claim 1, wherein said manganese compound is selected from the

group consisting of electrolytic manganese dioxide, chemical manganese dioxide, Mn_2O_3 and Mn_3O_4 .

5. (Previously Presented): The method for preparing the manganese compound according to claim 2, wherein said manganese compound is selected from the group consisting of electrolytic manganese dioxide, chemical manganese dioxide Mn_2O_3 and Mn_3O_4 .
6. (Canceled).
7. (Canceled).
8. (Previously Presented): The method for preparing the manganese compound according to claim 1, wherein a manganese compound having a shape without edges is prepared from an angular shaped manganese compound as a raw material and applying mechanical force and heat energy.
9. (Previously Presented): The method for preparing the manganese compound according to claim 2, wherein a manganese compound having a shape without edges is prepared from an angular shaped manganese compound as a raw material and applying mechanical force and heat energy.
10. (Currently Amended): A method for preparing lithium manganese complex oxide with a spinel structure, comprising the steps of:
 - a) mixing
 - (i) a manganese compound prepared by the method comprising the step of simultaneously applying a mechanical force from 0.1 to 1000 dyne/cm² and a heat energy from 50 to 200 °C at a time from 5 minutes to 5 hours to a manganese compound to remove defects present in the particles of said manganese compound and to control the aggregation of micro particles and the shape of the aggregated particles, wherein the mechanical force and a heat treatment is applied in an apparatus which applies shear stress to the surface of particles and to which a heating apparatus is attached, and the

manganese compound gathers along a rotating chamber wall and receives shear stress and compression stress at a fixing axis of the apparatus; and

(ii) a lithium compound ; and

b) calcining the mixture prepared in said step (a).

11. (Original): A method for preparing a lithium manganese complex oxide with a spinel structure according to claim 10, wherein the (ii) lithium compound of step (a) is selected from a lithium salt group consisting of LiOH , $\text{LiOH} \cdot \text{H}_2\text{O}$, LiCH_2COO , LiCHO , $\text{LiCHO} \cdot \text{H}_2\text{O}$ and LiNO_3 .
12. (Original): A method for preparing the lithium manganese complex oxide with a spinel structure according to claim 10, wherein the temperature of calcination of said step (b) is 400 to 900 °C, and the time of calcination is 1 to 30 hours.
13. (Original): A method for preparing the lithium manganese complex oxide with a spinel structure according to claim 11, wherein the temperature of calcination of said step (b) is 400 to 900 °C, and the time of calcination is 1 to 30 hours.
14. (Currently Amended): A lithium or lithium ion secondary battery comprising an anode, an electrolyte and a cathode using a lithium manganese complex oxide powder with a spinel structure as an active material, wherein said active material is a lithium manganese complex oxide with a spinel structure prepared by the method comprising the steps of:
 - a) mixing
 - (i) a manganese compound prepared by the method comprising the step of simultaneously applying a mechanical force from 0.1 to 1000 dyne/cm² and a heat energy from 50 to 200 °C at a time from 5 minutes to 5 hours to a manganese compound to remove defects present in particles of the manganese compound and to control the aggregation of micro particles and the shapes of the aggregated particles, wherein the mechanical force and a

heat treatment is applied in an apparatus which applies shear stress to the surface of particles and to which a heating apparatus is attached, and the manganese compound gathers along a rotating chamber wall and receives shear stress and compression stress at a fixing axis of the apparatus; and
(ii) a lithium compound; and
b) calcining the mixture.

15. (Currently Amended): A method for preparing a manganese compound that is used for preparing a lithium manganese complex oxide, comprising the ~~step of~~simultaneously applying a mechanical force from 0.1 to 1000 dyne/cm² and a heat energy from 50 to 200 °C at a time from 5 minutes to 5 hours to a manganese compound to remove defects present in particles of said manganese compound, and to control the aggregation of micro particles and the shape of the aggregated particles, wherein the mechanical force and a heat treatment is applied in an apparatus which applies shear stress to the surface of particles and to which a heating apparatus is attached, and the manganese compound gathers along a rotating chamber wall and receives shear stress and compression stress at a fixing axis of the apparatus.
16. (Canceled).
17. (Canceled).
18. (Currently Amended): The method for preparing a manganese compound according to claim ~~16~~ 1, wherein the apparatus is a mechanofusion mill.